[redacted]

ADVANCED RECONNAISSANCE SYSTEM

1679

Short Title	ARS: WS-117L
Official Nickname	"New Horizon"

The primary objective of the WS-117L program is to provide continuous surveillance (visual, electronic and infrared) coverage of the USSR and USSR-dominated countries. In keeping with this objective, the types of intelligence required in order of priority are:

Strategic warning
Enemy military forces in being
Enemy military stockpiles of thermonuclear-atomic weapons
Enemy logistic capabilities
Enemy industrial war capabilities.

The WS-117L program development plan embodies the placement of a series of unmanned satellites in prescribed orbits about the earth. The satellites will possess a capability for transmitting acquired information to supporting ground stations in a form which permits subsequent data processing and analyses for operational and scientific uses. The complete system incorporates the launching, tracking, data gathering, data processing, interpretation and dissemination functions of the ground support complex.

Operational vehicles will be launched from within United States territory. The ICBM Atlas will supply the primary propulsion for ascent to an altitude of approximately 300 statute miles, where a substantially circular orbit will be established by means of the satellite vehicle rocket engine.

Key R&D actions leading to initiation of the program were:

March 1955	GOR 80 (SA-2C) issued
October 1955	System Requirement established
March 1956	Evaluation of Design Study completed
April 1956	Development Plan prepared
August 1956	Hq. USAF approval of Development Plan; Development Directive issued
October 1956	Letter Contract AF 04(647)-97 issued to Lockheed Aircraft Corp., Missile Systems Division, as Weapon System Contractor.

[redacted]

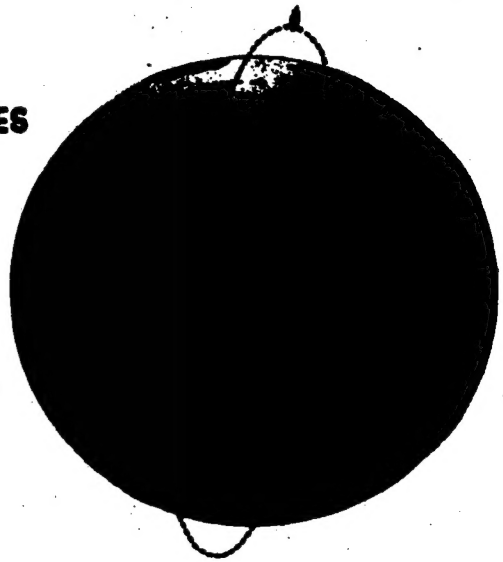
[redacted]

[redacted]

[redacted]

KEY CHARACTERISTICS

- COMPLETE TARGET AREA COVERAGE
- ACCURATE SPECIFIC TARGET LOCATION
- CONTINUOUS TARGET AREA SURVEILLANCE
- INSTANTANEOUS WARNING OF ICBM ATTACK
- NEARLY INVULNERABLE TO ATTACK OR COUNTER MEASURES
- NO AIRCREWS
- NO OVERSEAS BASES
- INVADES NO AIRSPACE
- HIGH DATA RATE
- ECONOMICAL PER UNIT OF DATA
- FAST RESPONSE
- GROWTH POTENTIAL



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[redacted]

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

[redacted]

KEY CHARACTERISTICS OF 117L

A LISTING OF 12 OUTSTANDING FEATURES OF WEAPON SYSTEM 117L, AS PREPARED BY THE AIR FORCE BALLISTIC MISSILES DIVISION, HQ., AIR RESEARCH AND DEVELOPMENT COMMAND.

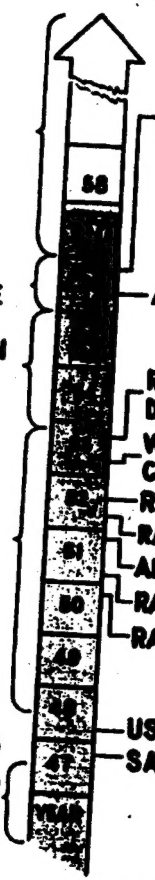
[redacted]

[redacted]

R & D COSTS PER PHASE (000'S)

- DEVELOPMENT PHASE — $8,300
- CONTRACT PROPOSAL PHASE — 1,500
- USAF EVALUATION STUDIES — 7,400
- USAF PROJECT RAND R AND D STUDIES — 1,500
- ROCKETRY STUDIES BY UNITED STATES, GERMANY, USSR AND OTHERS

TOTAL COST TO DATE 18,700



[redacted]

- LOCKHEED AIRCRAFT CORPORATION MISSILE SYSTEMS DIVISION SELECTED AS WEAPON SYSTEM CONTRACTOR
- AFBM ASSUMES SYSTEM RESPONSIBILITY FOR WS-117L
- RAND RECOMMENDS AND USAF ESTABLISHES A SATELLITE DEVELOPMENT PROGRAM
- WADC CONTRACTS WITH NAA FOR ASCENT GUIDANCE AND CONTROL STUDIES
- RAND SUB-CONTRACTS WITH RCA FOR TELEVISION STUDIES
- RAND SUB-CONTRACTS WITH NAA FOR ORBITAL ATTITUDE CONTROL STUDIES
- AEC INITIATES STUDIES NUCLEAR APU FEASIBILITY
- RAND ISSUES SATELLITE UTILITY REPORT
- RAND RECOMMENDS CRITICAL SATELLITE COMPONENT DEVELOPMENT
- USAF REQUESTS RAND TO STUDY SATELLITE DEVELOPMENT
- SATELLITE TECHNICAL FEASIBILITY DETERMINED

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[redacted]

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

[redacted]

ADVANCED RECONNAISSANCE SYSTEM
— HISTORICAL EVOLUTION —

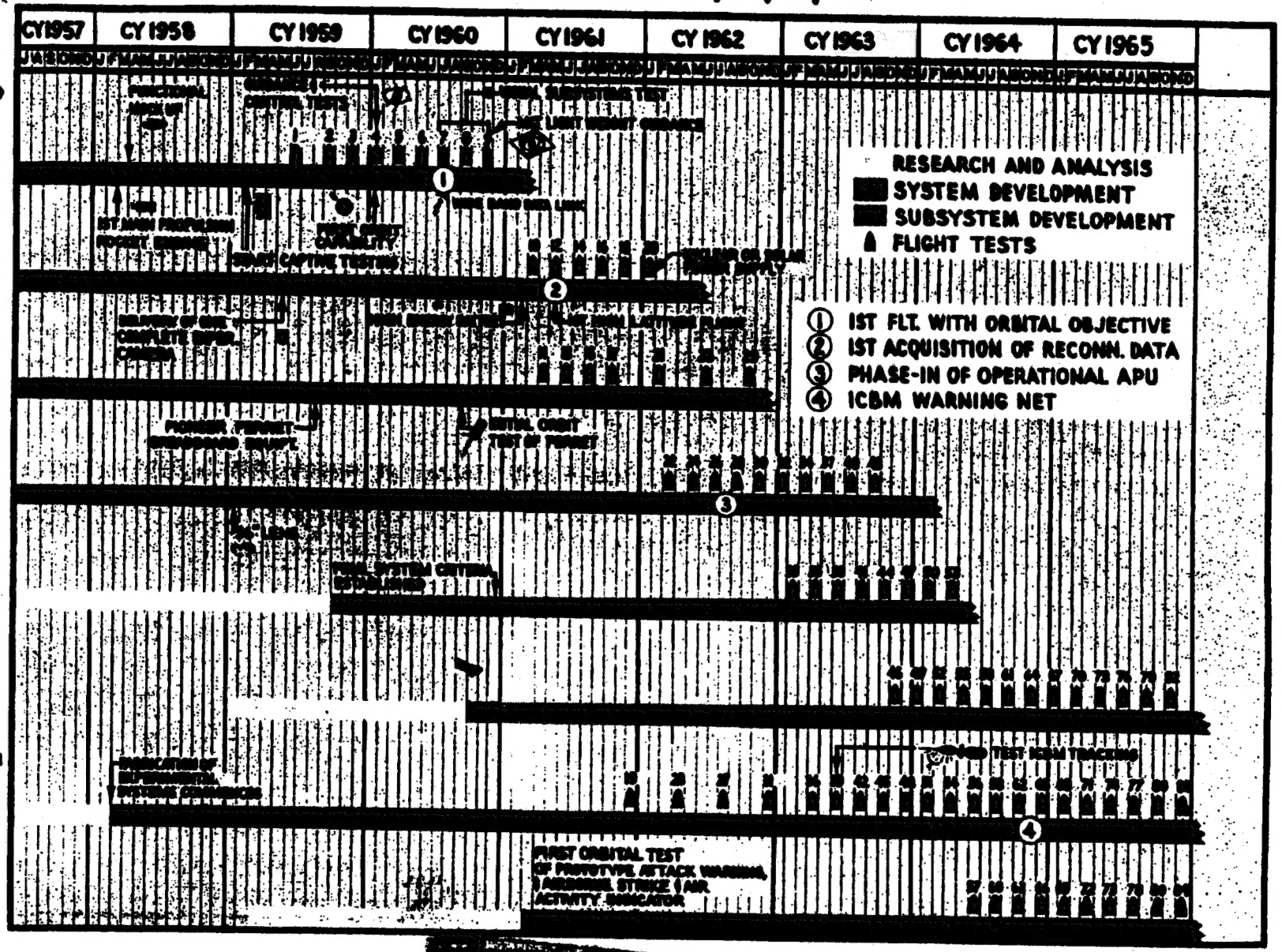
TRACES EVOLUTION OF THE ADVANCED RECONNAISSANCE SYSTEM FROM THE FEASIBILITY STUDY PHASE BEGINNING IN 1946, THROUGH SEPT., 1957, INDICATING TOTAL AIR FORCE EXPENDITURES FOR THIS PURPOSE TO THE LATTER DATE.

[redacted]

[redacted]

[redacted]

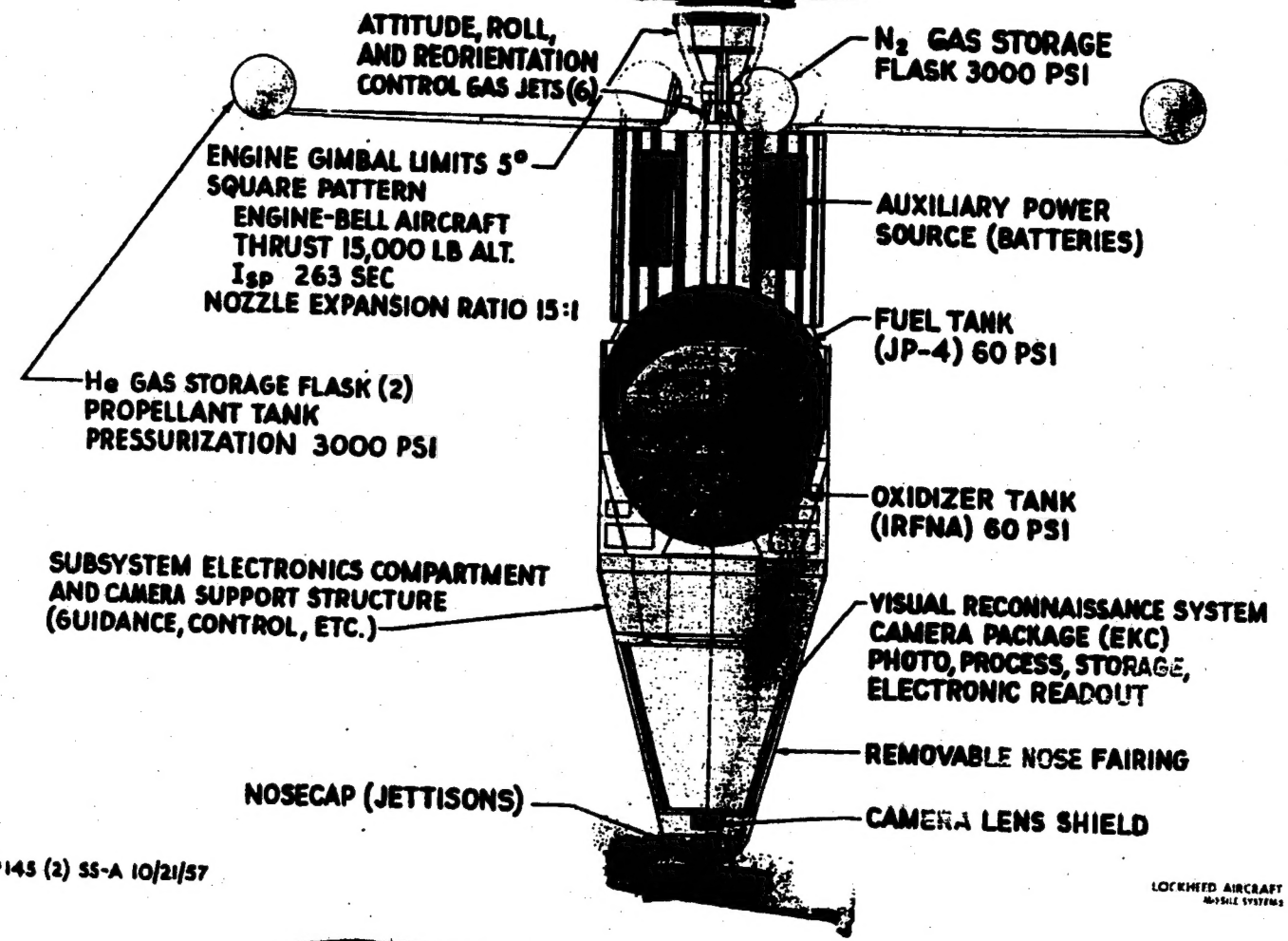
W/S CONTRACTOR'S PROPOSAL, 10/28/57



LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

[redacted]



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LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

[redacted]

[redacted]

WS-117L ORBITAL THRUST ENGINE

HOTOGRAPH OF MOCKUP OF BELL AIRCRAFT CORPORATION'S "HUSTLER" NGINE WHICH WILL BE USED TO ACCELERATE THE WS-117L SATELLITE EHICLE TO ORBITAL VELOCITY.

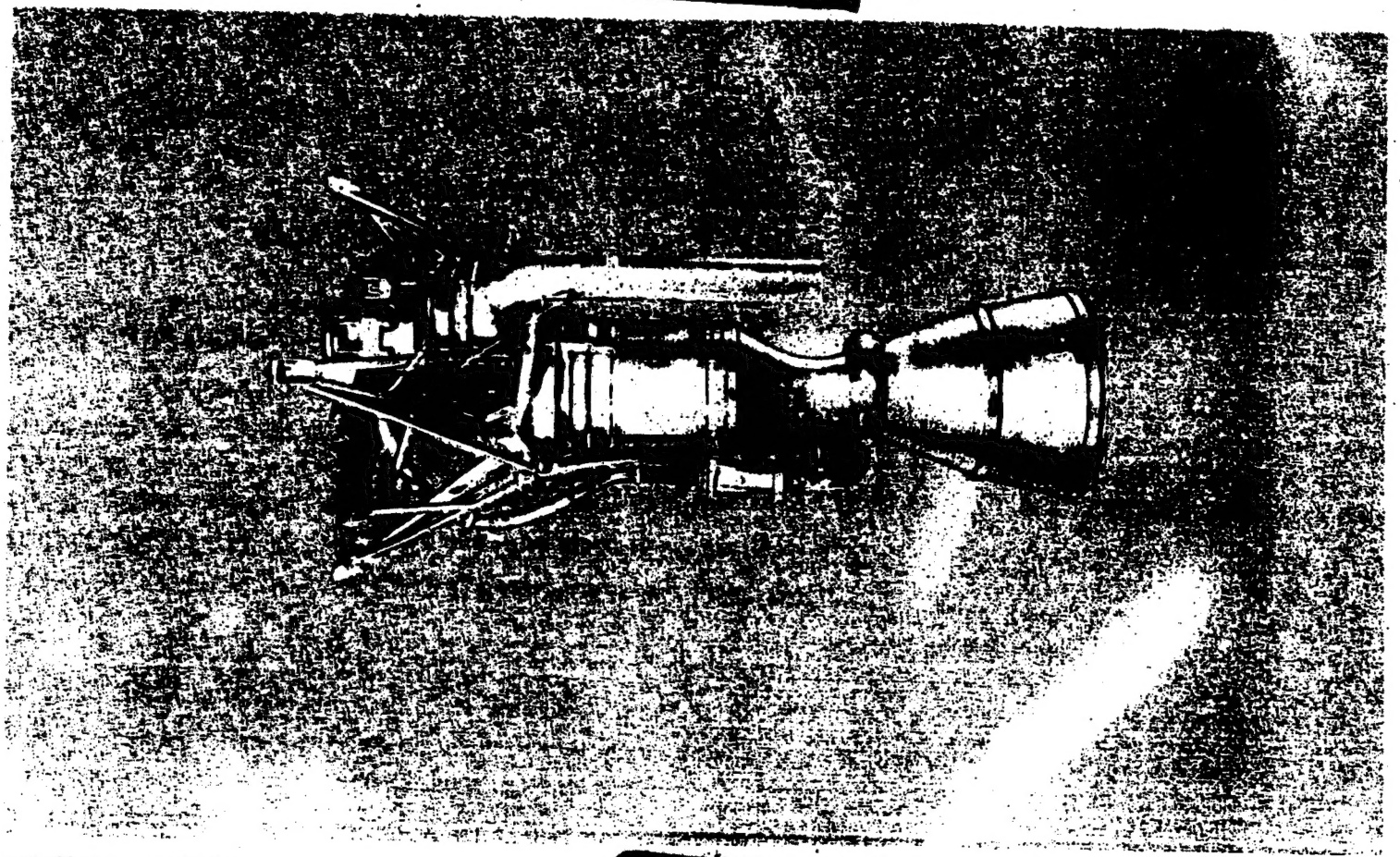
PERFORMANCE SPECIFICATIONS:

15,150 LBS. THRUST IN A VACUUM

MINIMUM SPECIFIC IMPULSE -- 263 sec

MAXIMUM SPECIFIC IMPULSE -- 269 sec

[redacted]



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[redacted]

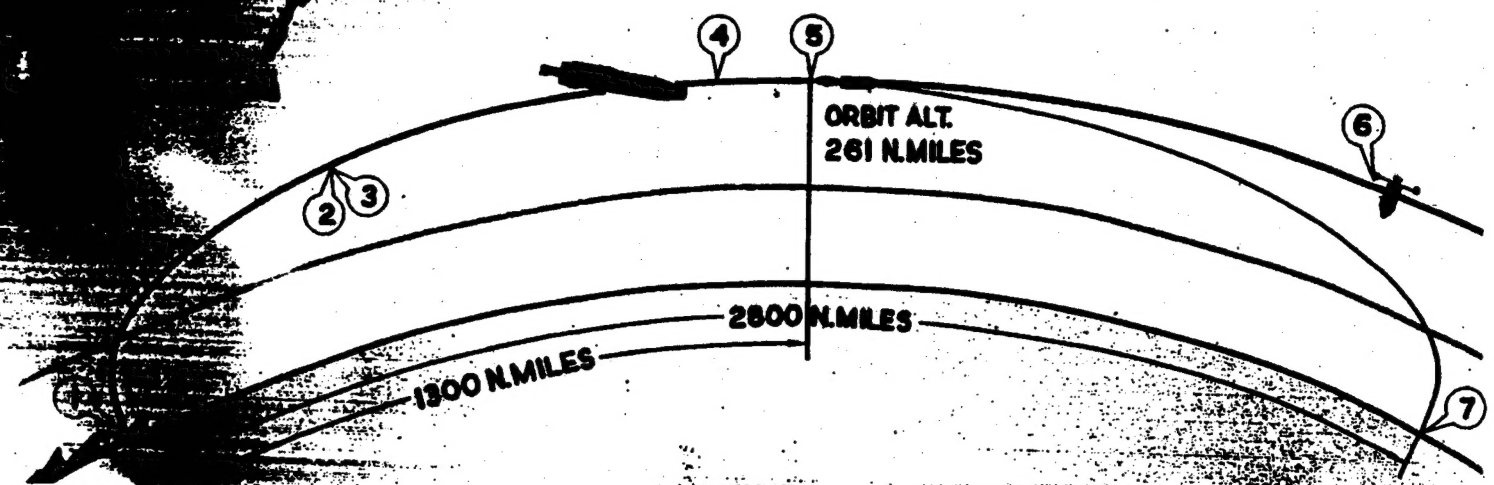
LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

TAKE OFF CONDITION

[redacted]ERALL LENGTH	87.4 FT.
[redacted]OSTER DIAMETER	10 FT.
[redacted]ELLITE DIAMETER	5 FT.
[redacted]ELLITE LENGTH	21.0 FT.

1. LAUNCH
2. END POWERED BOOST
3. SEPARATE [redacted] MIL COAST
4. BEGIN [redacted]
5. [redacted]
6. FINAL [redacted]TITUDE
7. BOOSTER IMPACT POINT



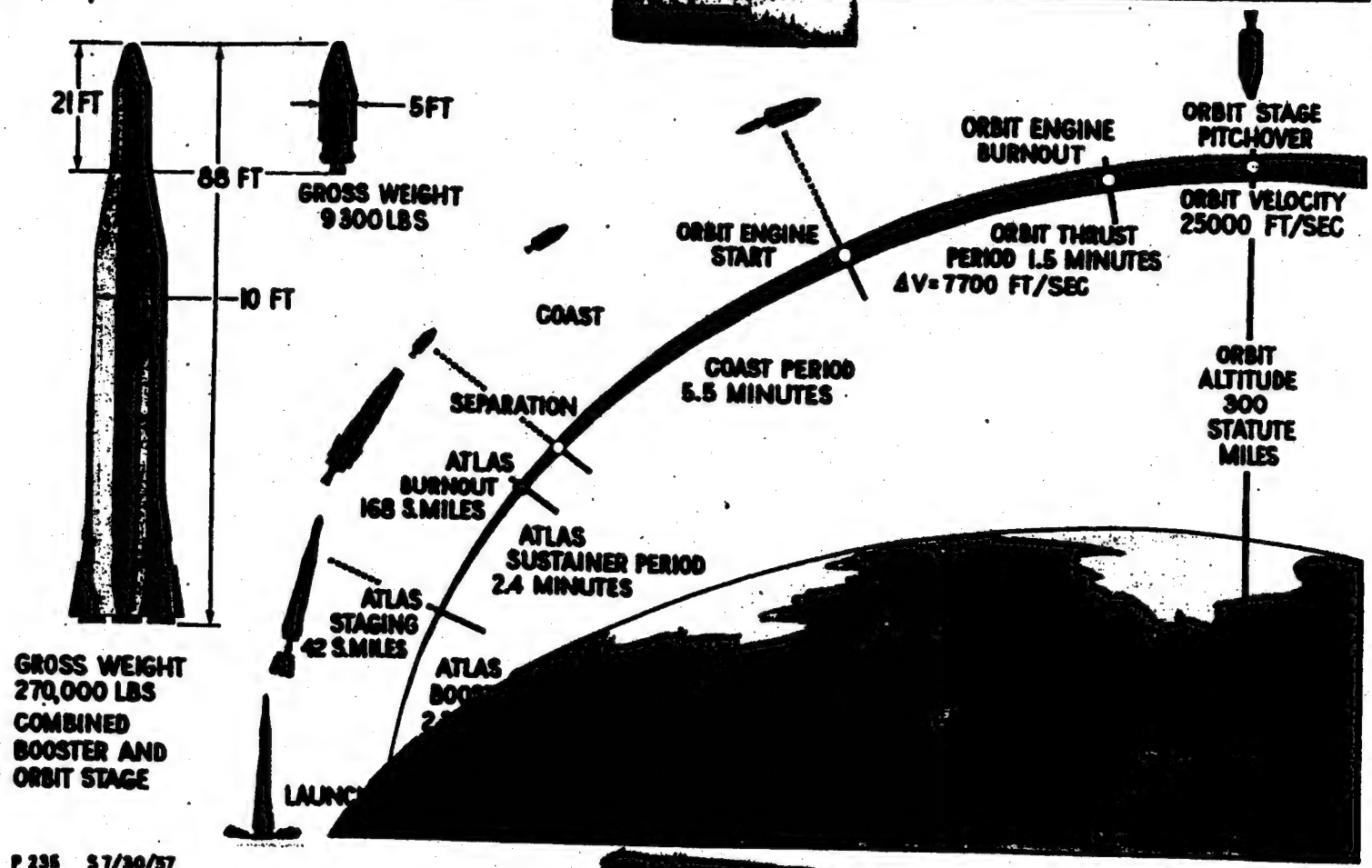
P99[illegible]s 7/24/[illegible]

[redacted]

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

WS-117L VEHICLE TRA[illegible]

PRESENTS TAKE-OFF DIMENSIONS OF [illegible] CHED TO ATLAS BOOSTER, AND INDICATES KEY POINTS [illegible] FLIGHT LAUNCH TO ATTAINMENT OF ORBITAL ALTITUDE AND ATTITUDE.



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LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

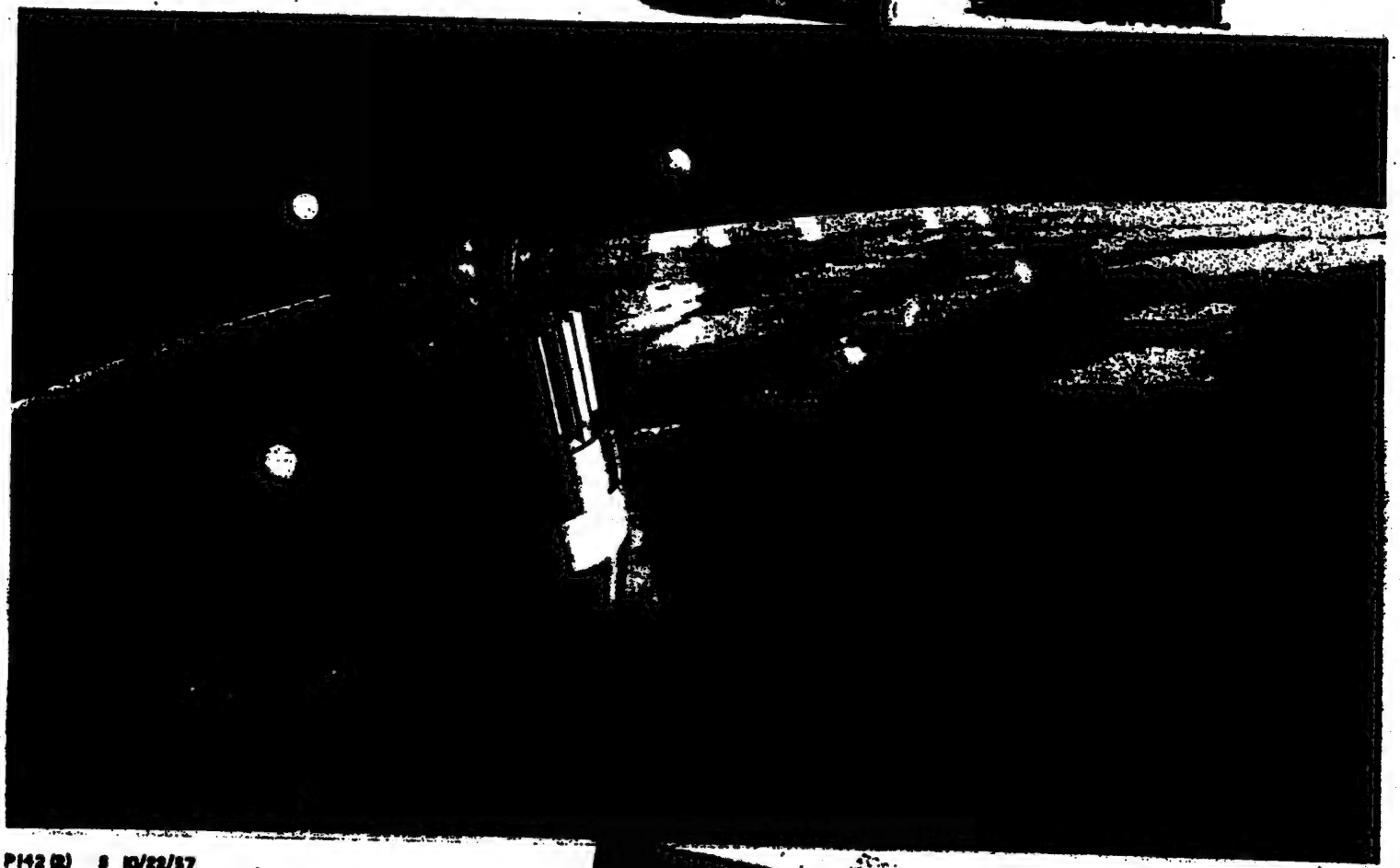
WS-117L TRAJECTORY TO ORBIT

A MORE DETAILED PRESENTATION OF FLIGHT LAUNCH PHASE, INDICATING GUIDANCE AND CONTROL PROBLEMS WHICH MUST BE RESOLVED IN ORDER TO ACHIEVE ORBITAL CAPABILITY.

[redacted]

[redacted]

UNCLASSIFIED



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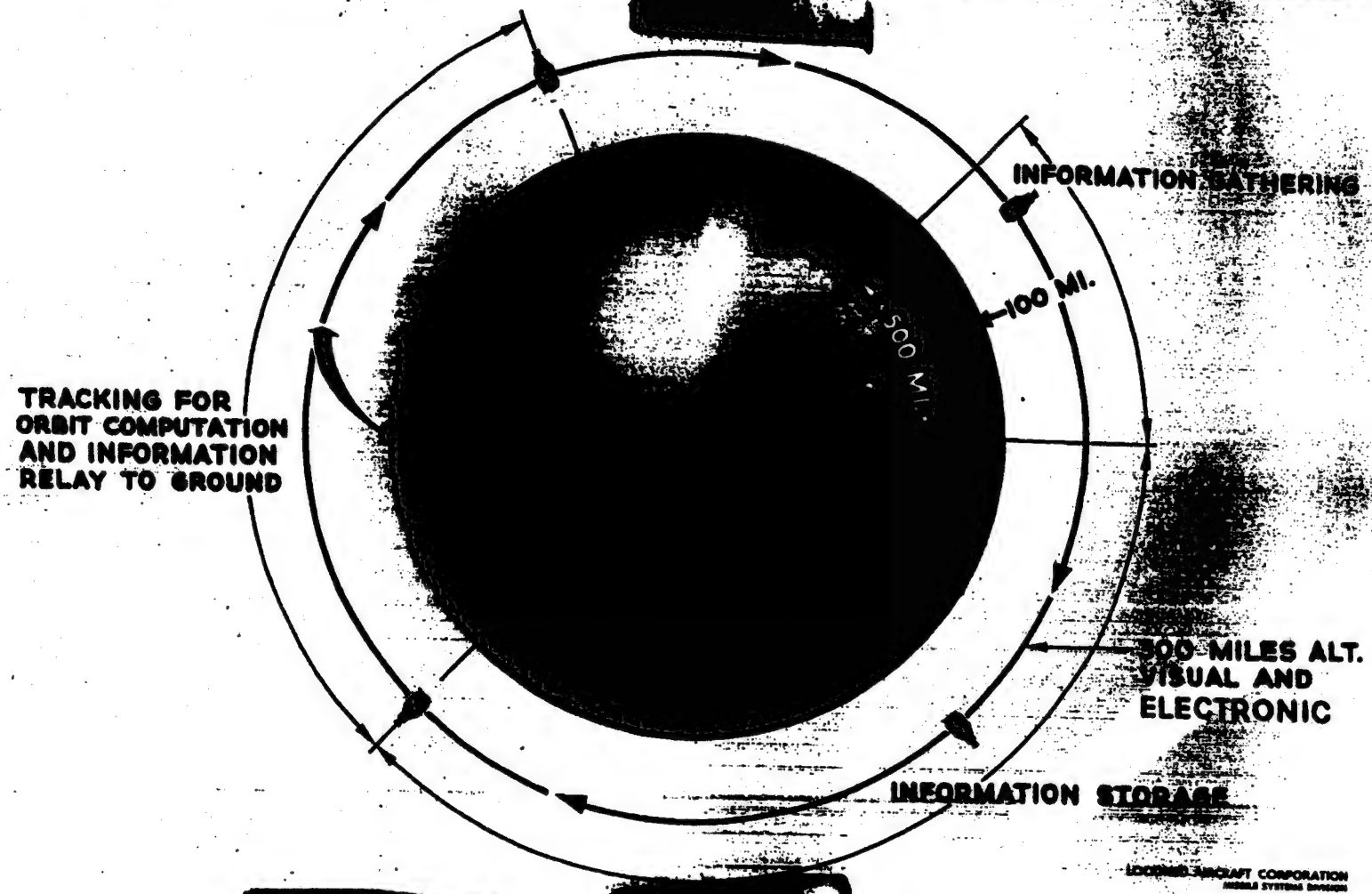
LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

[redacted]

[redacted]



[redacted]

[redacted] [redacted]

[illegible]
[illegible]
EST, THEN RELAYS [illegible]
LOCATED CONTROL STATION

[redacted] [redacted]

[redacted]

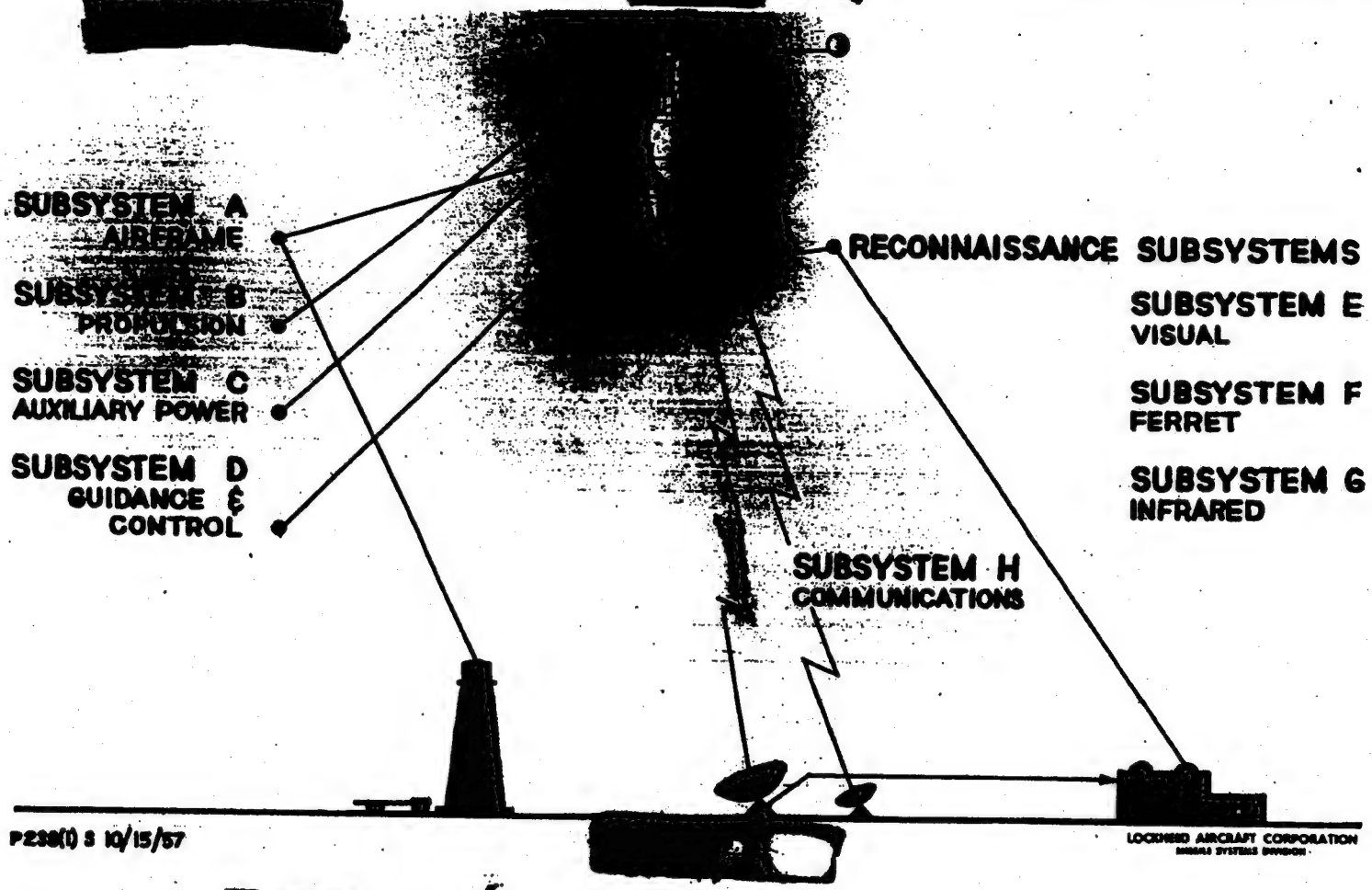
[redacted] 117L SATELLITE [redacted] REE ORBIT

DEMONSTRATES [redacted]
NAISSANCE COVERAGE OF [redacted]
ENABLING SECURE "READ-OUT" OF [redacted]
STATIONS LOCATED WITHIN THE CONTINENTAL [redacted]
TERRITORIES.

[redacted]

[redacted]

[redacted]



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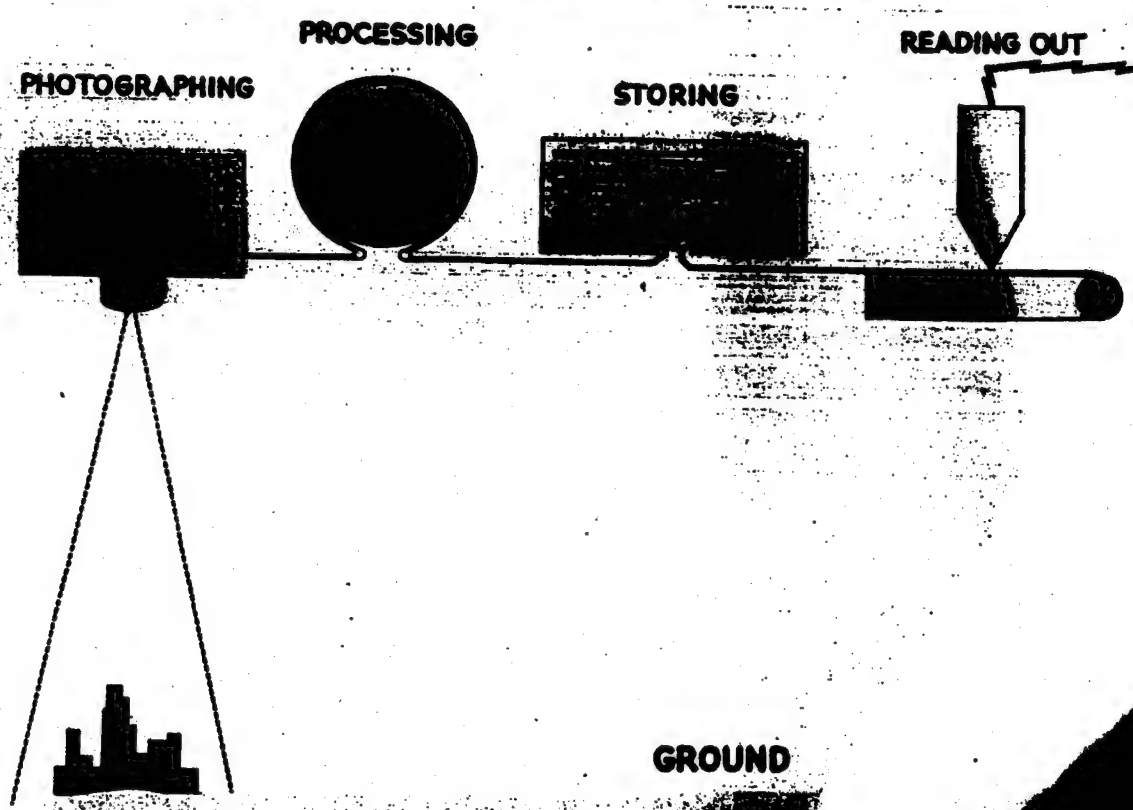
LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

[redacted]

[redacted]

[redacted]

VEHICLE-BORNE PROCESSOR



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[redacted]

[redacted]

[redacted]

WS-117L VISUAL RECONNAISSANCE SYSTEM
VEHICLE-BORNE PROCESSES

A SCHEMATIC DIAGRAM OF THE SATELLITE VEHICLE-BORNE OPERATING PROCESSES REQUIRED FOR VISUAL (PHOTOGRAPHIC) RECONNAISSANCE.

SERVING AS A SUBCONTRACTOR TO LOCKHEED MISSILE SYSTEMS DIVISION, THE EASTMAN KODAK COMPANY ASSISTED BY THE COLUMBIA BROADCASTING SYSTEM LABORATORIES IS DIRECTING THE RESEARCH, DEVELOPMENT, FABRICATION AND ASSEMBLY OF VISUAL PAYLOAD COMPONENTS.

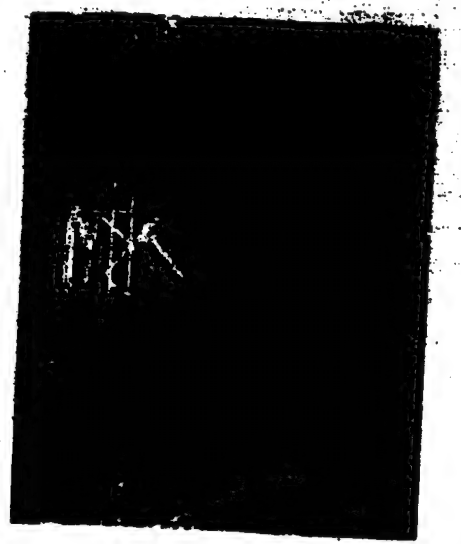
[redacted]

[redacted]

[redacted] IMAGE READOUT

6 INCH LENS

100-FOOT RESOLUTION



ORIGINAL SCENE

FILM IMAGE
IN SATELLITE

IMAGE RECORDED
ON GROUND

[redacted]

[redacted]

PIONEER VISUAL RECONNAISSANCE SYSTEM SIMULATED PHOTOGRAPHS — 6-INCH LENS

[redacted] PRESENTS LABORATORY-SIMULATED PHOTOGRAPHS DEMONSTRATING THE QUALITY OF DATA TO BE EXPECTED FROM THE OPERATION OF A PIONEER VISUAL RECONNAISSANCE SYSTEM UTILIZING A 6-INCH FOCAL-LENGTH CAMERA LENS, 100-FOOT RESOLUTION.

BALLOON-BORNE HIGH-ALTITUDE FLIGHT TESTS CONDUCTED IN SEPTEMBER 1957 CONFIRM THESE LABORATORY SIMULATIONS.

[redacted] [redacted]

36 INCH LENS

17-FOOT RESOLUTION

ORIGINAL SCENE

FILM IMAGE
IN SATELLITE

IMAGE RECORDED
ON GROUND

ADVANCED VISUAL RECONNAISSANCE SYSTEM
SIMULATED PHOTOGRAPH

[redacted]

SIMULATED PHOTOGRAPH

[redacted] BE EXPECTED FROM THE

VISUAL RECONNAISSANCE SYSTEM (WS-117L, T

INCH FOCAL LENGTH LENS CAMERA, 17-FOOT, RE

THE 36-INCH LENS IS IN AN ADVANCED STATE OF D

DELIVERY OF THE FIRST UNIT SCHEDULED FOR JAN

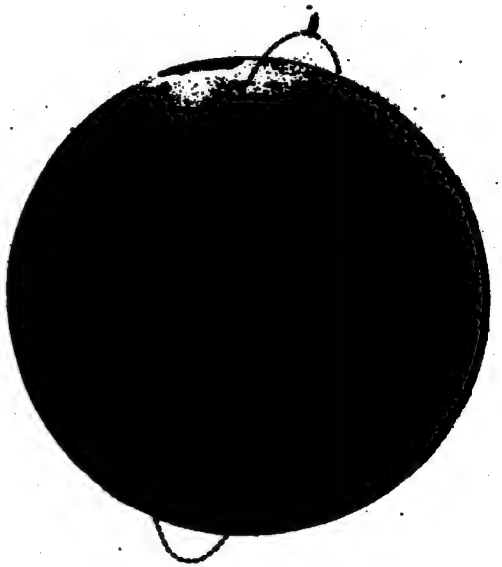
[redacted]

OBJECTIVE

THE OBJECTIVE OF ELECTRONIC RECONNAISSANCE IS TO DETECT AND OBTAIN INFORMATION ON ELECTRONIC EMITTERS IN AREAS WHERE SUCH INFORMATION DOES NOT NOW EXIST.

ADVANTAGES OF SATELLITE FERRET SYSTEM OVER CONVENTIONAL FERRET TECHNIQUES:

- COMPLETE WORLD COVERAGE
- CONTINUOUS UNATTENDED SURVEILLANCE
- ALL WEATHER OPERATION
- RELATIVE FREEDOM FROM CAMOUFLAGE
- ABILITY TO IDENTIFY HIGH PRIORITY INSTALLATIONS BY ELECTRONIC SIGNATURES
- RAPID RECOVERY AND DISSEMINATION OF ELINT INFORMATION



[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

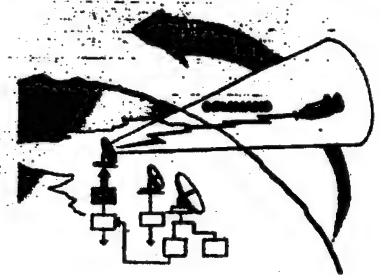
[redacted]

[redacted]

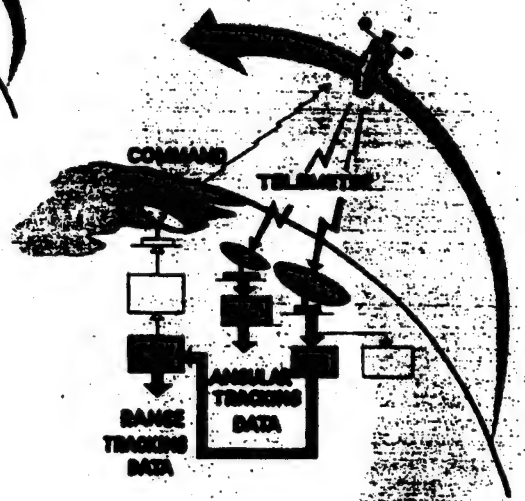
STATEMENT OF PRINCIPAL OPERATIONAL OBJECTIVES OF THE INFRA-RED SATELLITE RECONNAISSANCE SYSTEM, IDENTIFIED AS SUBSYSTEM "G"; PROGRAM VIII OF THE WS-117L DEVELOPMENT PLAN.

[redacted]

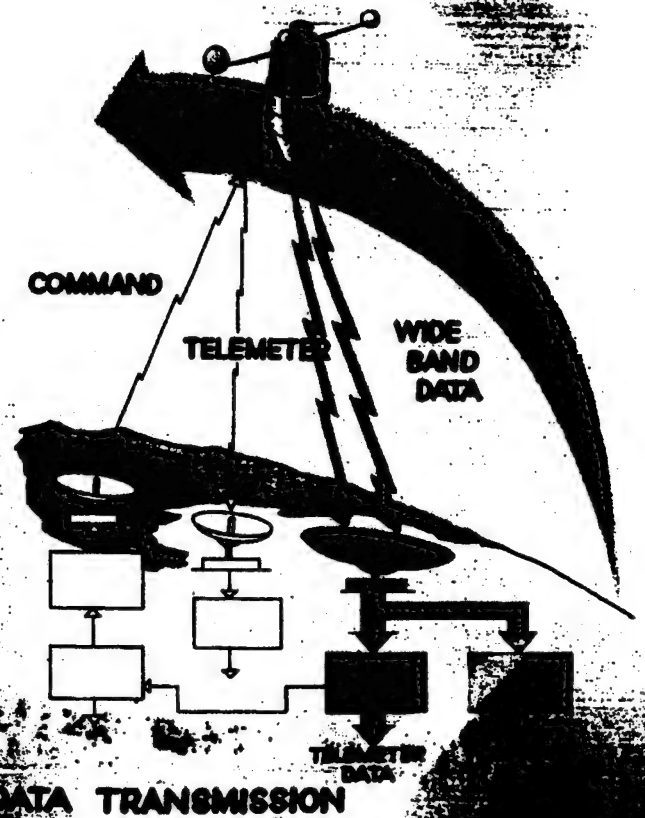
TYPES OF OPERATION



ACQUISITION



TRACKING



DATA TRANSMISSION

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WS-117L COMMUNICATION SYSTEM

ILLUSTRATES THE PRINCIPAL AREAS ENCOMPASSED BY THE WS-117L GROUND-SPACE COMMUNICATION SYSTEM:

SATELLITE ACQUISITION (LOCATING THE VEHICLE IN SPACE)

SATELLITE TRACKING; ORBIT COMPUTATION AND PREDICTION

DATA TRANSMISSION – COMMUNICATIONS FROM SATELLITE TO GROUND, GROUND TO SATELLITE, AND GROUND TO GROUND.

THE PHILCO CORPORATION IS SERVING AS THE PRINCIPAL SUBCONTRACTOR FOR THIS SUBSYSTEM OF WS-117L.

[redacted]

[redacted] PROVIDED BY WS-117L VEHICLE CAPABILITY

- PAYLOAD WEIGHT CAP[redacted] TO A TON (MORE FOR ADVANCED VERS[redacted]
- PAYLOAD VOLUME CAP[redacted] 70 CUBIC FEET
- ATTITUDE ORIENTATION [redacted]IZATION TO ±1 DEGREE
- NUMBER OF VEHICLES AVAILABLE, ESPECIALLY FOR SMALLER PAYLOADS (DUE TO WS-117L REQUIREMENTS AND USE OF OPERATIONAL MISSILE FOR BOOSTER)
- LONG ORBITING DURATION AFFORDED BY 300-MILE ALTITUDES OR HIGHER
- LONG PAYLOAD OPERATION WITH MODEST POWER THROUGH SOLAR OR CHEMICAL BATTERIES; OR WITH NUCLEAR AUXILIARY POWER PLANTS FOR HIGH POWER
- POLAR ORBITS AVAILABLE THROUGH PERFORMANCE MARGIN AND IOC LAUNCHING SITE
- WIDE-BAND DATA LINK FOR TRANSMISSION OF INFORMATION
- CAPACITY TO CARRY TWO OR MORE PAYLOADS FOR COINCIDENCE-TYPE EXPERIMENTS
- GUIDANCE ACCURACY TO PLACE VEHICLE INTO ORBITS OF AS LITTLE AS 20-MILE ECCENTRICITY
- POSSIBILITY OF SETTING UP LINKS BETWEEN TWO SATELLITES
- HIGHER ALTITUDES INCLUDING POSSIBILITY OF 70-POUND PAYLOADS AT 2700 MILES
- TRACKING SYSTEM MEASUREMENTS ANGULAR TO ±1 MIL AND ALTITUDE TO .1 MILE

[redacted]

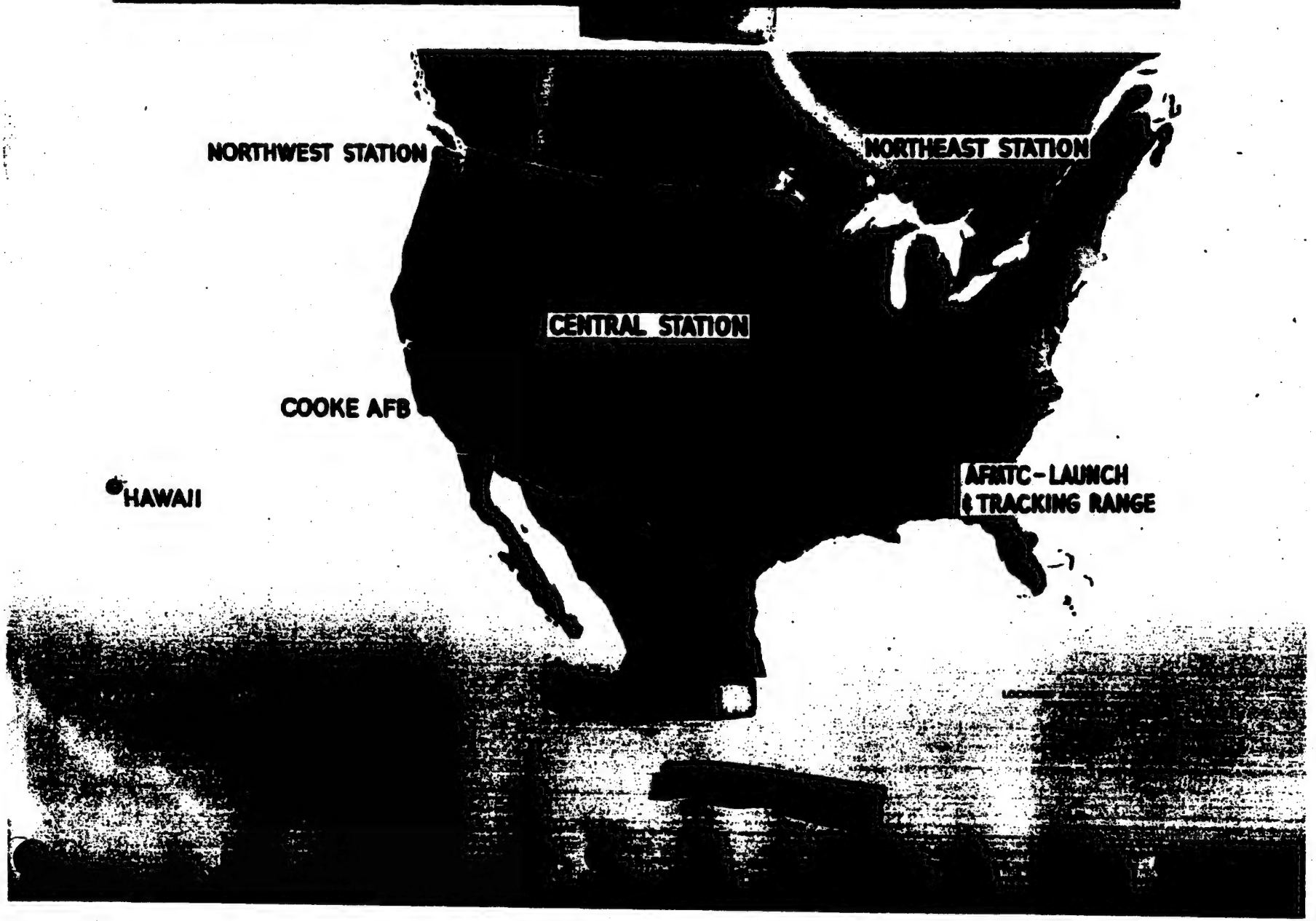
[redacted]

[redacted]

[redacted]

A LISTING OF [redacted] SATELLITE [redacted]
WHICH MAKE IT ATTRACTIVE AS A [redacted] OR GEO-
PHYSICAL RESEARCH PURPOSES.

[redacted]


NORTHWEST STATION
NORTHEAST STATION
CENTRAL STATION
COOKE AFB
HAWAII
AFMTC-LAUNCH
& TRACKING RANGE

[redacted]

WS-117L FACILITY REQUIREMENTS

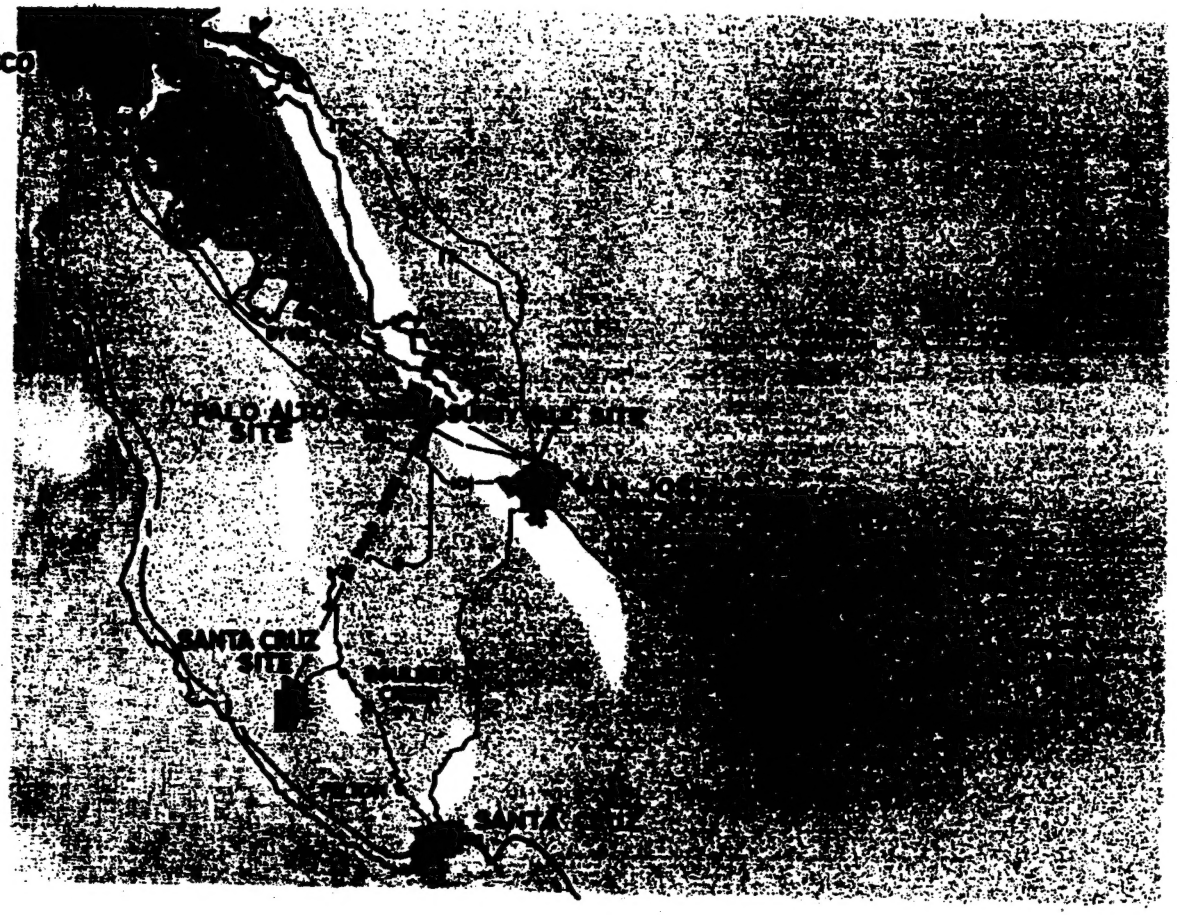
A PLOT OF THE PRINCIPAL FACILITIES REQUIRED FOR THE FLIGHT TESTING AND OPERATION OF THE ADVANCED RECONNAISSANCE SYSTEM.

NEW AIR FORCE FACILITIES REQUIRED SOLELY FOR THE ARS SYSTEM ARE:

- PACIFIC (HAWAIIAN) TRACKING STATION
- NORTHEAST AND NORTHWEST U. S. TRACKING STATIONS
- CENTRAL U. S. TRACKING AND CONTROL STATION
- INTELLIGENCE DATA-PROCESSING CENTER.

AN ICBM ATTACK ALARM SYSTEM WOULD REQUIRE CONSTRUCTION OF A [redacted] MODIFIED, WILL BE UTILIZED.

[redacted]



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LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

SAN FRANCISCO BAY AREA FACILITIES

[redacted] AREA SHOWING THE LOCATION OF RECENTLY [redacted] FOR THE EXCLUSIVE USE OF THE MISSILE [redacted] COMPRISING APPROXIMATELY 580,000 SQ. FT. [redacted] APITAL INVESTMENT IN EXCESS OF 28 MILLION DOLLARS ARE: [redacted]

PALO ALTO

RESEARCH AND DEVELOPMENT LABORATORIES
WS-117L PROJECT OFFICES

SUNNYVALE

DIVISION HEADQUARTERS
LABORATORIES, IN-PLANT TEST FACILITIES; PROTOTYPE FABRICATION

SANTA CRUZ MOUNTAINS

AN INTEGRATED FACILITY FOR ALL TYPES OF HAZARDOUS TESTS.

ADDITIONAL FACILITIES ARE UNDER CONSTRUCTION, OR IN THE ADVANCED PLANNING STAGE.

A COMPLETE MANUFACTURING FACILITY IS ALSO OPERATED AT VAN NUYS, CALIFORNIA.

[redacted]

[redacted]

AIRFRAME
A

- (TO BE DETERMINED) MISC. COMPONENTS & ASSEMBLIES

PROPULSION
B

- ● BELL AIRCRAFT MODIFICATION OF HUSTLER ENGINE
- (TO BE SELECTED) PRESSURE DIFFERENTIAL SWITCHES
- ROCKETDYNE/NAW PLASTIC PRESSURE REGULATOR
- (TO BE SELECTED) VILLAGE ORIENTATION ROCKETS

AUXILIARY POWER
C

- ● SONOTONE SECONDARY BATTERY
- ● EAGLE PICHER PRIMARY BATTERY
- (TO BE SELECTED) 400 CPS INVERTER
- (TO BE SELECTED) 2 KC INVERTER
- (TO BE SELECTED) 28 VOLT REGULATOR

GUIDANCE CONTROL
D

- (TO BE SELECTED) HORIZON SCANNER
- (TO BE SELECTED) PROPORTIONAL CONTROL VALVE
- BELL AIRCRAFT AFT CAN MOCKUP
- ● MIT ATTITUDE CONTROL (ASSOCIATE CONTRACTOR)

VISUAL RECONNAISSANCE
E

- ● EASTMAN KODAK VISUAL RECONNAISSANCE
  - ● CDS VIDEO READOUT
  - ● OPICA 36" LENS
- ● AMPEX AIRBORNE VIDEO RECORDER
- (TO BE SELECTED) TV RECONNAISSANCE FEASIBILITY

FERRET RECONNAISSANCE
F

- ● AIL FERRET
- HAMS INVERNO & SIGNAL OPERATIONAL REQUIREMENTS

INFRARED
G

- ● EASTMAN KODAK CO IR-DETECTION AND COOLING TECHNIQUE DEVELOPMENT
- ● BAIRD ATOMIC BACKGROUND RADIATION INVESTIGATION
- ● AEROJET IR-DETECTION SYSTEM STUDY & PRELIMINARY DESIGN
- ● GENERAL MILLS BALLOON FLIGHTS
- ● EASTMAN KODAK CO IR-AUTOMATIC TARGET DETECTION TRACKING PROGRAM

GROUND-SPACE COMMUNICATION
H

- ● PHILCO GROUND-SPACE COMMUNICATIONS
  - (TO BE DETERMINED) DME
  - (TO BE DETERMINED) PRECISION TRACKING
- AMPEX WIDE BAND VIDEO RESEARCH

OPERATIONS

- ● KAISER STEEL GANTRY MODIFICATION STUDY
- ● AEROJET STP A&E
- ● [illegible] ACQUISITION STATION A&E

SYSTEM

- PLANNING RESEARCH SYSTEM SIMULATION STUDY

● CONTRACT SELECTION APPROVED BY AFSMD

[redacted]

[redacted]